

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2004-103397

(43)Date of publication of application : 02.04.2004

(51)Int.Cl.

H01M 8/04

(21)Application number : 2002-263788

(71)Applicant : MATSUSHITA ELECTRIC IND CO LTD

(22)Date of filing : 10.09.2002

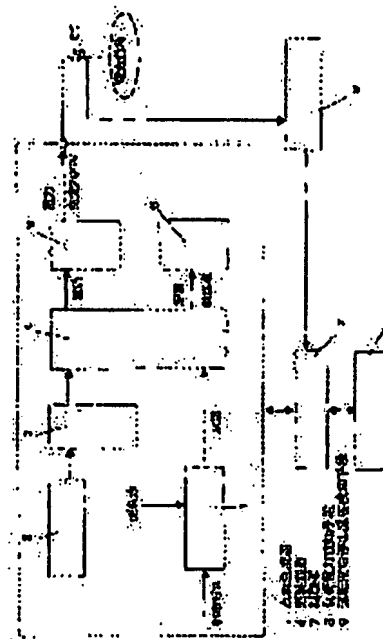
(72)Inventor : OTANI AKIHITO

## (54) CONTROL DEVICE OF FUEL CELL SYSTEM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide a control device capable of preventing durability of a system from being adversely influenced and cutting down waste of energy, by most suitably carrying out operation starting/stopping control depending on detection frequency of an operation starting/stopping frequency detecting means.

**SOLUTION:** Operation starting/stopping control is carried out by freely changing a fixed power value and a time value under the condition of starting/stopping the operation in accordance with detection frequency of the operation starting/stopping frequency detecting means. Thereby, even if the power consumption pattern of a load varies depending on a time zone in which the fuel cell system is operated, an individual installation location, and seasonal changes at the installation location, the number of times to start and stop the operation of the fuel cell system is not increased. It can be even cut down.



## LEGAL STATUS

[Date of request for examination]

22.12.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

(19) 日本国特許庁(JP)

(12) 公開特許公報(A)

(11) 特許出願公開番号

特開2004-103397

(P2004-103397A)

(43) 公開日 平成16年4月2日(2004.4.2)

(51) Int.Cl.<sup>7</sup>

H01M 8/04

F1

H01M 8/04

X

H01M 8/04

Y

テーマコード(参考)

5H027

審査請求 未請求 請求項の数 8 O L (全 9 頁)

(21) 出願番号 特願2002-263788 (P2002-263788)  
 (22) 出願日 平成14年9月10日(2002.9.10)

(71) 出願人 000005821  
 松下電器産業株式会社  
 大阪府門真市大字門真1006番地  
 (74) 代理人 100097445  
 弁理士 岩橋 文雄  
 (74) 代理人 100103355  
 弁理士 坂口 智康  
 (74) 代理人 100109667  
 弁理士 内藤 浩樹  
 (72) 発明者 大谷 昭仁  
 大阪府門真市大字門真1006番地 松下  
 電器産業株式会社内  
 Fターム(参考) 5H027 AA02 KK00 KK52 MM26

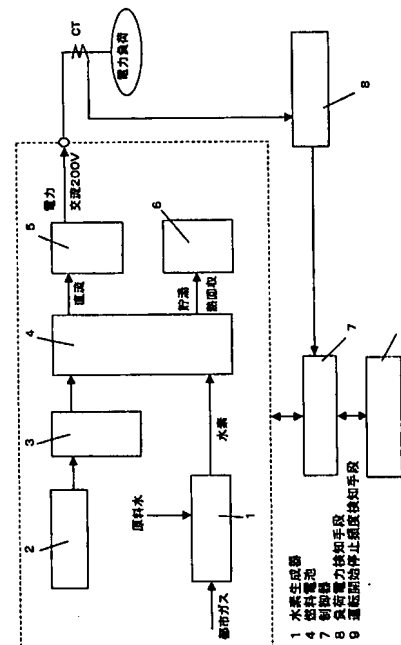
(54) 【発明の名称】 燃料電池システムの制御装置

(57) 【要約】

【課題】 制御器は運転開始停止頻度検知手段の検知頻度により、最適な運転開始停止制御を行い、システムの耐久性への悪影響防止およびエネルギーのむだを削減することを可能にする。

【解決手段】 運転開始停止頻度検知手段9の検知頻度により、運転開始停止条件中の一定電力値および時間値を自由に変えて運転開始停止制御を行う構成としたものであり、燃料電池システムを運転する時間帯や、個々の設置場所および設置場所での季節の変化等に応じて負荷電力消費パターンが異なっても、燃料電池システムの運転開始停止回数が増加せず、さらに削減することを目的とする。

【選択図】 図1



## 【特許請求の範囲】

## 【請求項 1】

炭化水素系原料燃料と水から水素に富んだガスを生成する水素生成器と、前記水素生成器で得られた生成ガスと酸化剤ガスを反応させて発電を行う燃料電池と、運転開始・停止および運転開始から発電までの一連の動作を制御する制御器と、運転開始・停止する間隔および回数を計測する運転開始停止頻度検知手段と、負荷電力を検知する負荷電力検知手段を備え、前記負荷電力検知手段により負荷電力が、一定電力値以上となるのが一定時間以上になった場合に前記制御器により運転を開始する条件とし、一定電力値以下となるのが一定時間以上になった場合に前記制御器により運転を停止する条件において、前記運転開始停止頻度検知手段の検知頻度により、前記条件中の一定電力値を自由に変えて運転開始・停止制御を行うことを特徴とする燃料電池システムの制御装置。

10

## 【請求項 2】

前記制御器は、前記運転開始停止頻度検知手段の検知頻度により、前記条件中の一定時間値を自由に変えて運転開始・停止制御を行うことを特徴とする請求項 1 記載の燃料電池システムの制御装置。

## 【請求項 3】

前記制御器は、運転する時間帯により、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行うことを特徴とする請求項 1 又は 2 に記載の燃料電池システムの制御装置。

## 【請求項 4】

運転の開始停止データを記憶する記憶手段を設け、前記制御器は、燃料電池システム設置後の最初の運転開始から一定期間の運転開始停止データを前記記憶手段に記憶し、そのデータに基づいて設置場所特有の電力消費パターンに応じて、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行うことを特徴とする請求項 1～3 のいずれか 1 項に記載の燃料電池システムの制御装置。

20

## 【請求項 5】

運転の開始停止データを記憶する記憶手段を設け、前記制御器は、1 年間毎の運転開始停止データを前記記憶手段に記憶し、そのデータに基づいてその設置場所での季節の変化に応じて、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行うことを特徴とする請求項 1～4 のいずれか 1 項に記載の燃料電池システムの制御装置。

30

## 【請求項 6】

電話回線等の通信手段を設け、前記制御器は、前記通信手段により、運転開始停止データを通信してホストコンピュータにデータを蓄積させ集中管理し、各燃料電池システムに反映させることにより、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行うことを特徴とする請求項 1～5 のいずれか 1 項に記載の燃料電池システムの制御装置。

## 【請求項 7】

1 日のうちで総運転開始停止回数に上限を設け、上限を超えて運転開始停止した場合、前記制御器は、運転開始しないようにすることを特徴とする請求項 1～6 のいずれか 1 項に記載の燃料電池システムの制御装置。

40

## 【請求項 8】

1 日のうちで総運転開始停止回数に上限を設け、上限を超えて運転開始停止した場合、前記制御器は、運転停止の一定期間中に異常報知することを特徴とする請求項 1～7 のいずれか 1 項に記載の燃料電池システムの制御装置。

## 【発明の詳細な説明】

## 【0001】

## 【発明の属する技術分野】

本発明は、燃料電池を用いて発電を行う燃料電池システムの制御装置に関するものである。

## 【0002】

50

## 【従来の技術】

以下に従来の燃料電池システムについて説明する。

## 【0003】

図4に示すように、従来この種の燃料電池システムの制御装置は、天然ガスやメタノールなどの原料燃料と水蒸気改質反応に必要な原料水から水素に富んだガスを生成する水素生成器1と、酸化剤ガスとしての空気を供給するためのブロアファンで構成される送風器2と、供給空気を加湿する空気加湿器3と、水素生成器1で得られた生成ガスと送風器2からの酸化剤ガスを反応させて発電する燃料電池4と、燃料電池4にて発電された直流電力を交流200Vに変換するインバータ5と、燃料電池4からの熱を回収し給湯する貯湯タンク6と、起動から発電までの一連の動作を制御する制御器7と、電力負荷での負荷電力を測定する負荷電力検知手段8で構成されている。前記負荷電力検知手段8で検知する負荷電力値とは、毎秒計測する瞬時負荷電力値を60分間積算し、その平均値を負荷電力値としている。すなわち一分間の負荷電力値である。ここで従来の燃料電池システムの運転開始条件として、負荷電力が最大発電電力の30%以上になってもすぐに運転開始しないで、負荷電力が最大発電電力の30%以上になるのが30分間中の80%以上になってから運転開始していた。また運転停止条件として、負荷電力が最大発電電力の30%以下になってもすぐに運転停止しないで、負荷電力が最大発電電力の1/8以下になるのが1時間中の80%以上になってから運転を停止していた。

10

## 【0004】

## 【発明が解決しようとする課題】

しかしながら上記の従来の構成では、燃料電池システムを運転する時間帯や、個々の設置場所および設置場所での季節の変化等により負荷電力消費パターンが異なり、一律の制御では燃料電池の運転開始停止回数が増加し、燃料電池システムの耐久性に悪影響を及ぼす問題を有していた。

20

## 【0005】

本発明は、上記従来の課題を解決するもので、燃料電池システムを運転する時間帯や、個々の設置場所および設置場所での季節の変化等に応じて負荷電力消費パターンが異なっても、燃料電池の運転開始停止回数が増加せず、さらに削減することを目的としている。

## 【0006】

## 【課題を解決するための手段】

本発明は上記目的を達成するために、燃料電池システムを運転する時間帯や、個々の設置場所および設置場所での季節の変化等に応じて負荷電力消費パターンが異なっても、燃料電池の運転開始停止回数が増加せず、さらに削減するものである。

30

## 【0007】

これにより燃料電池システムの耐久性に悪影響を及ぼすことを防止し、発電動作を行う前の燃料電池システムの予熱等の運転開始停止の繰り返しによるエネルギーのむだを削減することができる。

## 【0008】

## 【発明の実施の形態】

本発明の請求項1に記載の発明は、炭化水素系原料燃料と水から水素に富んだガスを生成する水素生成器と、前記水素生成器で得られた生成ガスと酸化剤ガスを反応させて発電を行う燃料電池と、運転開始・停止および運転開始から発電までの一連の動作を制御する制御器と、運転開始・停止する間隔および回数を計測する運転開始停止頻度検知手段と、負荷電力を検知する負荷電力検知手段を備え、前記負荷電力検知手段により負荷電力が、一定電力値以上となるのが一定時間以上になった場合に前記制御器により運転を開始する条件とし、一定電力値以下となるのが一定時間以上になった場合に前記制御器により運転を停止する条件において、前記運転開始停止頻度検知手段の検知頻度により、前記条件中の一定電力値を自由に変えて運転開始・停止制御を行う構成としたものであり、運転開始する条件中の「最大発電電力の30%」の値および運転停止する条件中の「最大発電電力の1/8」の値を、例えば10W単位で自由に変えることにより、運転開始停止回数を増

40

50

加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

【0009】

請求項2に記載の発明は、前記制御器は、前記運転開始停止頻度検知手段の検知頻度により、前記条件中の一定時間値を自由に変えて運転開始・停止制御を行う構成としたものであり、運転開始する条件中の「30分中の80%」の「80%」の値および運転停止する条件中の「1時間中の80%」の「80%」の値を、例えば1分単位で自由に変えることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

10

【0010】

請求項3に記載の発明は、前記制御器は、運転する時間帯により、前記条件中の一定値を自由に変えて運転開始・停止制御を行う構成としたものであり、運転する時間帯、例えば昼間と夜間、さらに夜間でも午後7時から12時と午後12時から翌朝5時の時間帯により区別して、一定電力値および一定時間値を変えることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

【0011】

20

請求項4に記載の発明は、運転の開始停止データを記憶する記憶手段を設け、前記制御器は、燃料電池システム設置後の最初の運転開始から一定期間の運転開始停止データを前記記憶手段に記憶し、そのデータに基づいて設置場所特有の電力消費パターンに応じて、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行う構成としたものであり、個々の設置場所にて特有の電力消費パターンがあり、例えば、单身・妻帯者・子供の人数など家族の人数構成、年齢構成、性別、あるいは都会・地方の区別、寒冷地・温暖地の区別等の様々な要因により、電力消費パターンが異なるので、それぞれのパターンに合わせた一定電力値および一定時間値に変えることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

30

【0012】

請求項5に記載の発明は、運転の開始停止データを記憶する記憶手段を設け、前記制御器は、1年間毎の運転開始停止データを前記記憶手段に記憶し、そのデータに基づいてその設置場所での季節の変化に応じて、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行う構成としたものであり、個々の燃料電池システムの設置場所での1年のうちの春夏秋冬の季節の変化により、電力消費パターンが異なるので、それぞれのパターンに合わせた一定電力値および一定時間値に変えることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

40

【0013】

請求項6に記載の発明は、電話回線等の通信手段を設け、前記制御器は、前記通信手段により、運転開始停止データを通信してホストコンピュータにデータを蓄積させ集中管理し、各燃料電池システムに反映させることにより、前記条件中の一定電力値・一定時間値を自由に変えて運転開始・停止制御を行う構成としたものであり、例えばガス会社のホストコンピュータに運転開始停止データを蓄積して、種々のパターンデータを解析することにより、一元的に最適な一定電力値および一定時間値に変えることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギー

50

のむだを削減することができる。

【0014】

請求項7に記載の発明は、1日のうちで総運転開始停止回数に上限を設け、上限を超えて運転開始停止した場合、前記制御器は、一定期間は運転開始しないようにする構成としたものであり、1日の総運転開始停止回数の上限を超えて運転開始停止した場合に、何らかの異常が発生したと考え、燃料電池システムの運転を停止し、一時的なエネルギーのむだを削減することができる。

【0015】

請求項8に記載の発明は、1日のうちで総運転開始停止回数に上限を設け、上限を超えて運転開始停止した場合、前記制御器は、異常報知する構成としたものであり、異常報知することにより、使用者に燃料電池システムの停止・異常を報知するとともに、電力負荷系統の点検、すなわち電化製品の異常や配電設備の異常を点検するよう使用者に知らせることができる。

【0016】

【実施例】

以下、本発明の実施例について図面を参照しながら説明する。

図において、図4で示した従来の燃料電池システムの制御装置と同じ機能を有するものについては同一符号を付与しており、これらの機能の詳細は従来の技術の説明に順ずるものとする。

【0017】

(実施例1)

図1は本発明の実施例1の燃料電池システムの制御装置の構成図である。運転開始停止頻度検知手段9は、前記制御器7による制御で運転開始から停止、停止から開始の間隔や回数をカウントし、運転開始停止制御する構成としており、前記運転開始停止頻度検知手段9により、運転開始から停止、停止から開始する間隔が短くなったり、運転開始・停止の回数が増加傾向にある場合、前記制御器7は運転開始時には、負荷電力が例えば「最大発電電力の30%以上」の「30%」を「1%」増加させる。つまり最大発電電力が1000Wの場合、負荷電力が「300W以上」を「310W以上」という条件に変える。また運転停止時には、負荷電力が例えば「最大発電電力の1/8以下」の「1/8(12.5%)」を「0.5%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「125W以下」を「120W以下」という条件に変える。但し増減する値は自由に設定できるものとする。つまり、運転開始あるいは停止する条件を運転開始停止頻度によって電力条件値を増減させて運転開始から停止、停止から開始する間隔を広くすることにより、運転開始停止回数を増加させず削減することができる。燃料電池の特性として連続運転よりもオンオフ運転の方が耐久性が悪くなる。よって燃料電池システムの耐久性への悪影響を防止でき、また発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの水素生成器やスタック等の予熱のためのエネルギーのむだを削減することができる。

【0018】

また図1に示すように運転開始停止頻度検知手段9は、前記制御器7による制御で運転開始から停止、停止から開始の間隔や回数をカウントし、運転開始停止制御する構成としており、前記運転開始停止頻度検知手段9により、運転開始から停止、停止から開始する間隔が短くなったり、運転開始・停止の回数が増加傾向にある場合、前記制御器7は運転開始時には、ある条件の電力以上になるのが例えば「30分間中の80%以上」になってから運転を開始するという「24分以上」を「1分」増加させる。つまりある条件の電力以上になるのが「30分間中の25分以上」になってから運転を開始するという条件に変える。また運転停止時には、ある条件の電力以下になるのが例えば「1時間中の80%以上」になってから運転を停止するという「48分以上」を「1分」増加させる。つまりある条件の電力以下になるのが「1時間中の49分以上」になってから運転を停止するという条件に変える。但し増加する値は自由に設定できるものとする。つまり、運転開始あるいは停止する際の条件を運転開始停止頻度によって時間条件値を増加させて運転開始

から停止、停止から開始する間隔を広くすることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

#### 【0019】

また前記制御器7は、運転する時間帯により運転開始・停止制御する構成としている。運転する時間帯例えば夜間では、前記負荷電力検知手段8による負荷電力が昼間より比較的大きい。特に夜の午後7時から12時帯では空調や照明およびテレビなどの電化製品で消費する電力が多くなる。また負荷のオンオフの回数増加による負荷電力の変動も大きくなり、燃料電池システムの運転開始停止する頻度も増加傾向になる。このため夜間の午後7時から12時帯では特に運転時間を長くするような条件設定にする必要がある。つまり運転開始時には、負荷電力が例えば「最大発電電力の30%以上」の「30%」を「10%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「300W以上」を「200W以上」という条件に変える。また一定時間値を例えば「30分間中の80%以上」の「24分以上」を「3分」減少させる。つまり「30分間中の21分以上」になってから運転を開始するという条件に変える。また運転停止時には、負荷電力が例えば「最大発電電力の1/8以下」の「1/8(12.5%)」を「2.5%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「125W以下」を「100W以下」という条件に変える。また一定時間値を例えば「1時間中の80%以上」を「3分」増加させ、「1時間中の51分以上」になってから運転を停止するという条件に変える。但しここの増減する電力値および時間値は自由に設定できるものとする。同様に夜間の午後12時から翌朝の5時では、消費電力が極端に少なくなり、同時に負荷のオンオフ回数も減少するので、同様の方法で運転停止する時間を長くするよう条件設定するようにする。このように運転開始あるいは停止する際の条件を、運転する時間帯によって、負荷電力値および時間値を増減させて運転開始停止制御を行うことにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

#### 【0020】

また図2において記憶手段10は燃料電池システムの運転の開始停止データを記憶し、そのデータに基づいて設置場所特有の電力消費パターンに応じて、運転開始・停止制御を行う構成としている。前記記憶手段10において燃料電池システム設置後の最初の運転開始から一定期間の運転開始停止データ、例えば1日毎の運転開始時刻や停止時刻を一定期間にわたりデータとして記憶している。ここで燃料電池システムの個々の設置場所にて種々の電力消費パターンが考えられる。例えば、単身者・妻帯者・子供の人数などの家族の人数構成、年齢構成、性別、あるいは都会・地方の区別、寒冷地・温暖地の区別等の様々な要因により、電力消費パターンが異なり、負荷のオンオフの回数増加による負荷電力の変動も大きくなる。ここで燃料電池システムを設置後、一定期間の運転開始停止データを記憶手段10にて記憶し、電力消費が大きい場合、すなわち家族の人数構成が多い場合や若い年齢層の場合に冷暖房などの空調、照明や種々の電化製品に電力消費が多い場合などでは、燃料電池システムの運転時間を長くするような条件設定とする。つまり運転開始時には、負荷電力が「最大発電電力の30%以上」の「30%」を「10%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「300W以上」を「200W以上」という条件に変える。また一定時間値を「30分間中の80%以上」の「24分以上」を「3分」減少させる。つまり「30分間中の21分以上」になってから運転を開始するという条件に変える。また運転停止時には、負荷電力が例えば「最大発電電力の1/8以下」の「1/8(12.5%)」を「2.5%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「125W以下」を「100W以下」という条件に変える。また一定時間値を例えば「1時間中の80%以上」を「3分」増加させ、「1時間中の51分以上」になってから運転を停止するという条件に変える。但しここの増減する電力値お

よび時間値は自由に設定できるものとする。同様に消費電力が少ない場合は、同時に負荷のオンオフ回数も減少するので、同様の方法で運転停止する時間を長くするよう条件設定するようにする。このように運転開始あるいは停止する際の条件を、燃料電池システムの設置場所によって、負荷電力値および時間値を増減させて運転開始停止制御を行うことにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

#### 【0021】

また図2において、記憶手段10にて燃料電池システムの運転の開始停止データを記憶し、そのデータに基づいて、その設置場所での季節の変化に応じて、運転開始・停止制御を行う構成としている。1年中で春夏秋冬の季節の変化により電力消費パターンが異なり、特に夏場では冷房運転により、冬場では暖房運転により、消費電力が多くなったり、負荷のオンオフの回数の増加による負荷電力の変動も大きくなる。ここで、1年間毎の季節間のデータを前記記憶手段10にて記憶し、夏や冬などの電力消費が大きくなる場合に、燃料電池システムの運転時間を長くするような条件設定とする。つまり運転開始時には、負荷電力が例えば「最大発電電力の30%以上」の「30%」を「10%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「300W以上」を「200W以上」という条件に変える。また一定時間値を例えば「30分間中の80%以上」の「24分以上」を「3分」減少させる。つまり「30分間中の21分以上」になってから運転を開始するという条件に変える。また運転停止時には、負荷電力が例えば「最大発電電力の1/8以下」の「1/8 (12.5%)」を「2.5%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「125W以下」を「100W以下」という条件に変える。また一定時間値を例えば「1時間中の80%以上」を「3分」増加させ、「1時間中の51分以上」になってから運転を停止するという条件に変える。但しここでの増減する電力値および時間値は自由に設定できるものとする。このように運転開始あるいは停止する際の条件を、年間の季節の変化によって、負荷電力値および時間値を増減させて運転開始停止制御を行うことにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによるエネルギーのむだを削減することができる。

#### 【0022】

また図3において、電話回線等の通信手段11を設け、前記制御器7は、前記通信手段11により、運転開始停止データを通信してホストコンピュータにデータを蓄積させ集中管理し、各燃料電池システムに反映させることにより、運転開始・停止制御を行う構成としている。例えばガス会社のホストコンピュータに運転開始停止データを蓄積して、各設置場所毎の種々のパターンデータを解析することにより、電力消費が比較的大きい場合には、一元的に運転時間を長くするような条件設定にする。つまり運転開始時には、負荷電力が例えば「最大発電電力の30%以上」の「30%」を「10%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「300W以上」を「200W以上」という条件に変える。また一定時間値を例えば「30分間中の80%以上」の「24分以上」を「3分」減少させる。つまり「30分間中の21分以上」になってから運転を開始するという条件に変える。また運転停止時には、負荷電力が例えば「最大発電電力の1/8以下」の「1/8 (12.5%)」を「2.5%」減少させる。つまり最大発電電力が1000Wの場合、負荷電力が「125W以下」を「100W以下」という条件に変える。また一定時間値を例えば「1時間中の80%以上」を「3分」増加させ、「1時間中の51分以上」になってから運転を停止するという条件に変える。但しここでの増減する電力値および時間値は自由に設定できるものとする。また逆に消費電力が比較的小さい場合には、同様の方法で運転停止する時間を長くするよう条件設定するようにする。このように各設置場所での運転開始停止データを通信手段により、ホストコンピュータに蓄積して、集中管理し、種々のパターンデータを解析することにより、負荷電力値および時間値を増減させて、一元的に最適な運転開始停止制御を行うことにより、運転開始停止回数を増加させ



ず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

#### 【0023】

また図2において、1日のうちで総運転開始停止回数に上限を設け、上限を超えて運転開始・停止した場合、前記制御器7は、運転開始しないようにする構成としている。1日のうちの総運転開始停止回数の上限を通常運転では達しない程度での、通常の2倍程度に予め設定し、1日の総運転開始停止回数が予め設定された上限を超えて運転開始停止した場合に、何らかの異常が発生したと考えられる。ここで、この異常発生した場合の一つの例として、負荷電力検知手段8を含む、電力負荷系統に異常が生じた場合、前記制御器7は運転を開始しないようにする。これにより、燃料電池システムの異常運転、電力負荷系統の異常運転を防止し、一時的なエネルギーのむだも削減することができる。

10

#### 【0024】

また図2において、1日のうちで総運転開始停止回数に上限を設け、上限を超えて運転開始停止した場合、前記制御器7は、異常を報知する構成としている。1日の総運転開始停止回数が予め設定された上限を超えて運転開始停止した場合に、何らかの異常が発生したと考えられるが、この異常発生した場合の一つの例として、負荷電力検知手段8を含む、電力負荷系統に異常が生じた場合、その旨を知らせる異常報知をすることにより、使用者に燃料電池システムの停止・異常を報知するとともに電力負荷系統の点検、すなわち電化製品の異常や配電設備の異常を点検するよう使用者に知らせることができる。

20

#### 【0025】

##### 【発明の効果】

以上のように本発明によれば、燃料電池システムを運転開始あるいは停止する際の条件を、運転開始停止頻度によって電力条件値を増減させて運転開始から停止、停止から開始する間隔を広くすることにより、運転開始停止回数を増加させず削減することができ、燃料電池システムの耐久性への悪影響防止および発電動作を行う前の運転開始停止の繰り返しによる燃料電池システムの予熱等のエネルギーのむだを削減することができる。

##### 【図面の簡単な説明】

【図1】本発明の実施例1における燃料電池システムの制御装置のブロック図

【図2】本発明の実施例2における燃料電池システムの制御装置のブロック図

30

【図3】本発明の実施例3における燃料電池システムの制御装置のブロック図

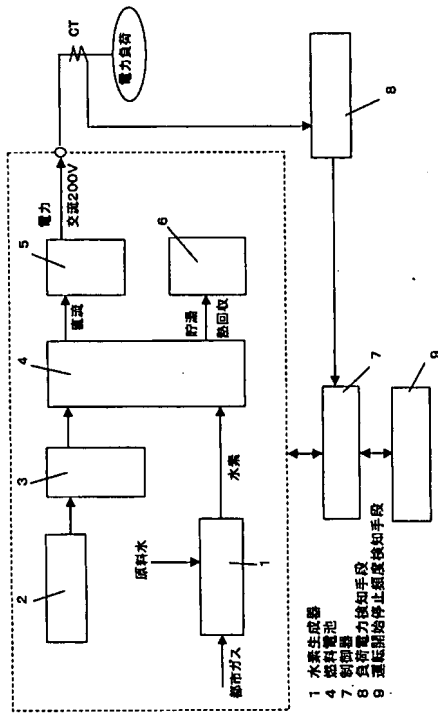
【図4】従来の燃料電池システムの制御装置のブロック図

##### 【符号の説明】

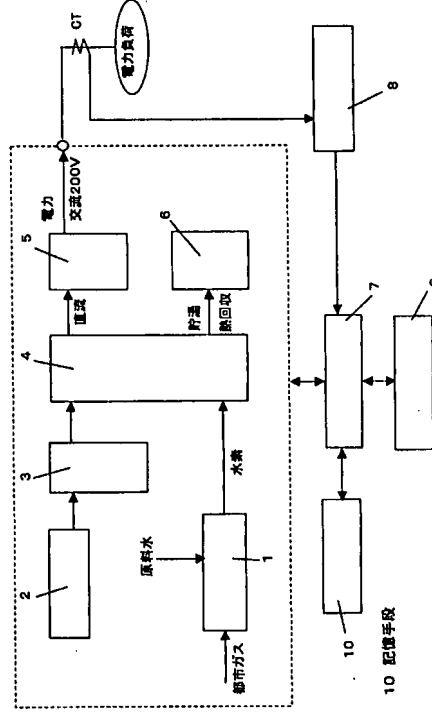
- 1 水素生成器
- 4 燃料電池
- 7 制御器
- 8 負荷電力検知手段
- 9 運転開始停止頻度検知手段
- 10 記憶手段
- 11 通信手段

40

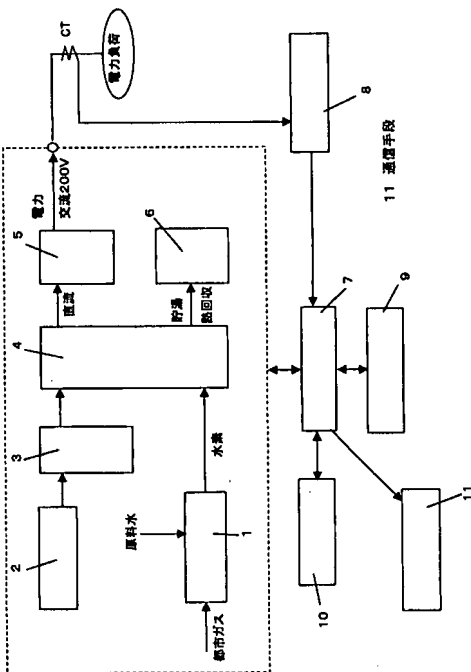
【図 1】



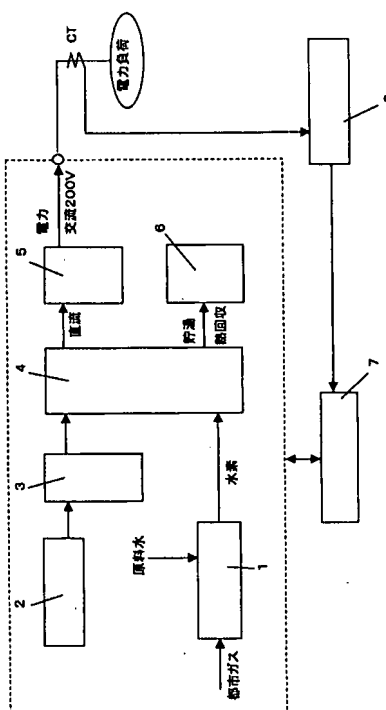
【図 2】



【図 3】



【図 4】



**Disclaimer:**

This English translation is produced by machine translation and may contain errors. The JPO, the INPIT, and those who drafted this document in the original language are not responsible for the result of the translation.

**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

Translated: 20:51:56 JST 09/11/2007

Dictionary: Last updated 09/07/2007 / Priority: 1. Electronic engineering / 2. Mathematics/Physics / 3. Technical term

---

**CLAIMS**

---

**[Claim(s)]****[Claim 1]**

Hydrocarbon system materials fuel and the hydrogen generation machine which generates the gas which was rich in hydrogen from water, The fuel cell which generates electricity by making the generation gas and oxidant gas which were obtained with said hydrogen generation machine react, The controller which controls a series of operation from commencement of commercial operation, a stop, and commencement of commercial operation to power generation, A commencement-of-commercial-operation stop frequency detection means to measure commencement of commercial operation, the gap to stop, and the number of times, Have a load power detection means to detect load power, and by said load power detection means [ load power ] In the conditions which stop operation with said controller when it becomes beyond a definite period of time that consider it as the conditions which start operation with said controller when it becomes beyond a definite period of time to become beyond a fixed power value, and below a fixed power value becomes The control unit of the fuel cell system characterized by changing the fixed power value in said condition freely, and performing commencement of commercial operation and stop control with the detection frequency of said commencement-of-commercial-operation stop frequency detection means.

**[Claim 2]**

Said controller is the control unit of the fuel cell system according to claim 1 characterized by changing freely the definite-period-of-time value in said condition, and performing commencement of commercial operation and stop control with the detection frequency of said commencement-of-commercial-operation stop frequency detection means.

**[Claim 3]**

Said controller is the control unit of the fuel cell system according to claim 1 or 2 characterized by changing freely the fixed power value and definite-period-of-time value in said condition,

and performing commencement of commercial operation and stop control by the time zone to operate.

[Claim 4]

Establish a memory means to memorize the start stop data of operation, and [ said controller ]  
The commencement-of-commercial-operation stop data of a fixed period is memorized for said memory means from the commencement of commercial operation of the beginning after fuel cell system installation. Claim 1 characterized by changing freely the fixed power value and definite-period-of-time value in said condition according to a power consumption pattern peculiar to a setting position based on the data, and performing commencement of commercial operation and stop control - the control unit of a fuel cell system given in any 1 clause of three.

[Claim 5]

Establish a memory means to memorize the start stop data of operation, and [ said controller ]  
Memorize the commencement-of-commercial-operation stop data for every one year for said memory means, and it responds to change of the season in the setting position based on the data. Claim 1 characterized by changing freely the fixed power value and definite-period-of-time value in said condition, and performing commencement of commercial operation and stop control - the control unit of a fuel cell system given in any 1 clause of four.

[Claim 6]

Establish means of communication, such as a telephone line, and [ said controller ] By communicating commencement-of-commercial-operation stop data, storing up data in a host computer, carrying out centralized control, and making it reflected in each fuel cell system by said means of communication Claim 1 characterized by changing freely the fixed power value and definite-period-of-time value in said condition, and performing commencement of commercial operation and stop control - the control unit of a fuel cell system given in any 1 clause of five.

[Claim 7]

It is the control unit of a fuel cell system given in Claim 1 characterized by carrying out commencement of commercial operation of said controller when a maximum is prepared in the total number of times of a commencement-of-commercial-operation stop among one day and a commencement-of-commercial-operation stop is carried out exceeding a maximum - any 1 clause of six.

[Claim 8]

It is the control unit of a fuel cell system given in Claim 1 characterized by carrying out unusual information of said controller during fixed [ of shut down ] when a maximum is prepared in the total number of times of a commencement-of-commercial-operation stop among one day and a commencement-of-commercial-operation stop is carried out exceeding a maximum - any 1 clause of seven.

## DETAILED DESCRIPTION

---

### [Detailed Description of the Invention]

[0001]

### [Field of the Invention]

This invention relates to the control unit of the fuel cell system which generates electricity using a fuel cell.

[0002]

### [Description of the Prior Art]

The conventional fuel cell system is explained below.

[0003]

As shown in drawing 4 , conventionally [ the control unit of this kind of fuel cell system ] Materials fuel, such as a natural gas and methanol, and the hydrogen generation machine 1 which generates the gas which was rich in hydrogen from materials water required for a steam reforming reaction, The ventilation machine 2 which consists of Blois fans for supplying the air as oxidant gas, The fuel cell 4 which the air humidifier 3 which humidifies supply air, and the generation gas and the oxidant gas from the ventilation machine 2 obtained with the hydrogen generation machine 1 are made to react, and is generated, It consists of load power detection means 8 to measure the inverter 5 which changes into Alternating Current 200V the direct current power generated with the fuel cell 4, the hot water reservoir tank 6 which collects and carries out hot-water supply of the heat from the fuel cell 4, the controller 7 which controls a series of operation from starting to power generation, and the load power in electric power load. The momentary load power value measured per second is integrated for 60 minutes, and the average is carried out to the load power value detected with said load power detection means 8 with the load power value. That is, it is a load power value for 1 minute. After it became throughout [ 80% or more of ] that load power turns into 30% or more of the maximum generated output for 30 minutes without carrying out commencement of commercial operation immediately, even if load power turned into 30% or more of the maximum generated output here as commencement-of-commercial-operation conditions for the conventional fuel cell system, commencement of commercial operation was carried out. Moreover, operation was stopped, after it became 80% or more in 1 hour that load power becomes 1/8 or less [ of the maximum generated output ] without carrying out shut down immediately, even if load power turned into 30% or less of the maximum generated output as shut down conditions.

[0004]

### [Problem to be solved by the invention]

However, the time zone which operates a fuel cell system with the above-mentioned conventional composition, The load power consumer expenditure income pattern changed with

change of the season in each setting position and setting position etc., and in uniform control, the number of times of a commencement-of-commercial-operation stop of the fuel cell increased, and it had the problem which has a bad influence on the endurance of a fuel cell system.

[0005]

This invention solves the above-mentioned conventional technical problem, and even if load power consumer expenditure income patterns differ according to the time zone which operates a fuel cell system, change of the season in each setting position and setting position, etc., the number of times of a commencement-of-commercial-operation stop of a fuel cell does not increase, but it aims at reducing further.

[0006]

[Means for solving problem]

The number of times of a commencement-of-commercial-operation stop of a fuel cell does not increase, but this inventions are further reduced, even if load power consumer expenditure income patterns differ according to the time zone which operates a fuel cell system, change of the season in each setting position and setting position, etc., in order to attain the above-mentioned purpose.

[0007]

It can prevent that this has a bad influence on the endurance of a fuel cell system, and the futility of the energy by repetition of commencement-of-commercial-operation stops, such as preheating of the fuel cell system before performing power generation operation, can be reduced.

[0008]

[Mode for carrying out the invention]

The hydrogen generation machine with which invention of this invention according to claim 1 generates the gas by which it was rich in hydrogen from hydrocarbon system materials fuel and water, The fuel cell which generates electricity by making the generation gas and oxidant gas which were obtained with said hydrogen generation machine react, The controller which controls a series of operation from commencement of commercial operation, a stop, and commencement of commercial operation to power generation, A commencement-of-commercial-operation stop frequency detection means to measure commencement of commercial operation, the gap to stop, and the number of times, Have a load power detection means to detect load power, and by said load power detection means [ load power ] In the conditions which stop operation with said controller when it becomes beyond a definite period of time that consider it as the conditions which start operation with said controller when it becomes beyond a definite period of time to become beyond a fixed power value, and below a fixed power value becomes It has composition which changes the fixed power value in said

condition freely, and performs commencement of commercial operation and stop control with the detection frequency of said commencement-of-commercial-operation stop frequency detection means. By changing freely the value of "30% of the maximum generated output" in the condition which carries out commencement of commercial operation, and the value of "1/8 of the maximum generated output" in the condition which carries out shut down, for example per 10W, the number of times of a commencement-of-commercial-operation stop is not made to increase, but it can reduce. The futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, is reducible.

[0009]

Invention according to claim 2 said controller [ with the detection frequency of said commencement-of-commercial-operation stop frequency detection means ] It has composition which changes freely the definite-period-of-time value in said condition, and performs commencement of commercial operation and stop control. [ "80% in 30 minutes" of value / "80%" of / in the condition which carries out commencement of commercial operation, and "80% in 1 hour" of value / "80%" of / in the condition which carries out shut down ] by changing freely, for example per 1 minute The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0010]

Invention according to claim 3 considers said controller as the composition which changes the constant value in said condition freely, and performs commencement of commercial operation and stop control by the time zone to operate. By distinguishing from 12:00 and 12:00 p.m. by the time zone at 5:00 from 7:00 p.m. in the next morning, and changing a fixed power value and a definite-period-of-time value further, also at night in the time zone to operate, for example, daytime, and the night The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0011]

Invention according to claim 4 establishes a memory means to memorize the start stop data of operation, and [ said controller ] The commencement-of-commercial-operation stop data of a fixed period is memorized for said memory means from the commencement of commercial

operation of the beginning after fuel cell system installation. It has composition which changes freely the fixed power value and definite-period-of-time value in said condition according to a power consumption pattern peculiar to a setting position based on the data, and performs commencement of commercial operation and stop control. There is a power consumption pattern characteristic in each setting position, and [ with for example, various factors, such as a family's number composition, such as the number of singleness, a married man, and a child, age composition, sex or distinction of a city and rural areas, and distinction of a cold district and the warm ground, ] By changing into the fixed power value and definite-period-of-time value which were united with each pattern, since power consumption patterns differ The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0012]

Invention according to claim 5 establishes a memory means to memorize the start stop data of operation, and [ said controller ] Memorize the commencement-of-commercial-operation stop data for every one year for said memory means, and it responds to change of the season in the setting position based on the data. [ have composition which changes freely the fixed power value and definite-period-of-time value in said condition, and performs commencement of commercial operation and stop control, and / with change of the season of the spring, summer, fall and winter of the one year in the setting position of each fuel cell system ] since power consumption patterns differ By changing into the fixed power value and definite-period-of-time value which were united with each pattern The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0013]

Invention according to claim 6 establishes means of communication, such as a telephone line, and [ said controller ] By communicating commencement-of-commercial-operation stop data, storing up data in a host computer, carrying out centralized control, and making it reflected in each fuel cell system by said means of communication By having composition which changes freely the fixed power value and definite-period-of-time value in said condition, and performs commencement of commercial operation and stop control, for example, storing commencement-of-commercial-operation stop data in the host computer of a gas company, and analyzing various pattern data By changing into the optimal fixed power value and a



definite-period-of-time value unitary, the number of times of a commencement-of-commercial-operation stop is not made to increase, but it can reduce. The futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, is reducible.

[0014]

When invention according to claim 7 prepares a maximum in the total number of times of a commencement-of-commercial-operation stop among one day and a commencement-of-commercial-operation stop is carried out exceeding a maximum, [ said controller ] When it has composition kept from carrying out commencement of commercial operation and a commencement-of-commercial-operation stop is carried out exceeding the maximum of the total number of times of a commencement-of-commercial-operation stop on the 1st during a fixed period, it is possible that a certain abnormalities occurred, operation of a fuel cell system can be stopped, and the futility of temporary energy can be reduced.

[0015]

When invention according to claim 8 prepares a maximum in the total number of times of a commencement-of-commercial-operation stop among one day and a commencement-of-commercial-operation stop is carried out exceeding a maximum, [ said controller ] While reporting a stop and malfunction of a fuel cell system to a user by having composition which carries out unusual information and carrying out unusual information, it can be told to a user that check of an electric power load system, i.e., the abnormalities of electric appliances and the abnormalities of a distribution plant, is checked.

[0016]

[Working example]

It explains hereafter, referring to Drawings about the work example of this invention.

In a figure, the same sign is given about what has the same function as the control unit of the conventional fuel cell system shown by drawing 4 , and let the details of these functions be a \*\*\*\*\* thing at explanation of a Prior art.

[0017]

(Work example 1)

Drawing 1 is the block diagram of the control unit of the fuel cell system of the work example 1 of this invention. From a stop and a stop, by control by said controller 7, the commencement-of-commercial-operation stop frequency detection means 9 counts, are considering it as the composition which carries out commencement-of-commercial-operation stop control from commencement of commercial operation, and the gap and the number of times of a start [ with said commencement-of-commercial-operation stop frequency detection means 9 ] When the gap started from a stop and a stop becomes short or the number of times of commencement of

commercial operation and a stop is increasing from commencement of commercial operation, at the time of commencement of commercial operation, as for said controller 7, load power carries out the increase of the "30%" of "30% or more of the maximum generated output" in "1%." That is, when the maximum generated output is 1000W, load power changes "more than 300W" into the conditions of "more than 310W." Moreover, at the time of shut down, load power carries out "0.5%" reduction of "one eighth (12.5%)" of "1/8 or less [ of the maximum generated output ]." That is, when the maximum generated output is 1000W, load power changes "less than 125W" into the conditions of "less than 120W." However, the value to fluctuate shall be set up freely. That is, by making an electric power condition value fluctuate commencement of commercial operation or the conditions to stop with commencement-of-commercial-operation stop frequency, and making large the gap started from a stop and a stop from commencement of commercial operation, the number of times of a commencement-of-commercial-operation stop is not made to increase, but it can reduce. In the on--off operation, endurance worsens rather than continuous running as characteristics of a fuel cell. Therefore, the futility of the energy for preheating, such as a hydrogen generation machine of the fuel cell system by repetition of the commencement-of-commercial-operation stop before being able to prevent the bad influence to the endurance of a fuel cell system and performing power generation operation, and a stack, is reducible.

[0018]

Moreover, as shown in drawing 1 , [ the commencement-of-commercial-operation stop frequency detection means 9 ] From a stop and a stop, by control by said controller 7, count the gap and the number of times of a start, are considering them as the composition which carries out commencement-of-commercial-operation stop control from commencement of commercial operation, and [ with said commencement-of-commercial-operation stop frequency detection means 9 ] When the gap started from a stop and a stop becomes short or the number of times of commencement of commercial operation and a stop is increasing from commencement of commercial operation, said controller 7 at the time of commencement of commercial operation After it becomes "throughout [ 30 minute / 80% or more of ]" to become more than the electric power of some conditions, the increase of the "24 minutes or more" of starting operation in "1 minute" is carried out. That is, after it becomes to become more than the electric power of some conditions in "25 minutes or more of a 30-minute throughout", it changes into the conditions of it being said that operation is started. Moreover, at the time of shut down, after it becomes "80% or more in 1 hour" to become below the electric power of some conditions, the increase of the "48 minutes or more" of stopping operation in "1 minute" is carried out. That is, after it becomes to become below the electric power of some conditions in "49 minutes or more in 1 hour", it changes into the conditions of stopping operation. However, the increasing value shall be set up freely. That is, by making a time condition value

increase commencement of commercial operation or the conditions at the time of stopping with commencement-of-commercial-operation stop frequency, and making large the gap started from a stop and a stop from commencement of commercial operation The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0019]

Moreover, said controller 7 is considered as commencement of commercial operation and the composition which carries out stop control by the time zone to operate. The load power according to said load power detection means 8, the time zone, for example, the night, to operate, is comparatively larger than daytime. The electric power especially consumed with electric appliances, such as air-conditioning, and Lighting Sub-Division, television, with a belt from 7:00 p.m. of night at 12:00 increases. Moreover, change of the load power by the increase in the number of times of on--off of load also becomes large, and the frequency of a fuel cell system which carries out a commencement-of-commercial-operation stop also begins to increase. For this reason, it is necessary to make it a condition setup which lengthens operation time especially with a belt from 7:00 p.m. at night at 12:00. That is, at the time of commencement of commercial operation, load power carries out "10%" reduction of the "30%" of "30% or more of the maximum generated output." That is, when the maximum generated output is 1000W, load power changes "more than 300W" into the conditions of "more than 200W." Moreover, "3-minute" reduction of the "24 minutes or more" of "80% or more of a 30-minute throughout" is carried out for a definite-period-of-time value. That is, after becoming in "21 minutes or more of a 30-minute throughout", it changes into the conditions of starting operation. Moreover, at the time of shut down, load power carries out "2.5%" reduction of "one eighth (12.5%)" of "1/8 or less [ of the maximum generated output ]." That is, when the maximum generated output is 1000W, load power changes "less than 125W" into the conditions of "less than 100W." Moreover, after carrying out the increase of "the 80% or more in 1 hour" in "3 minute" and becoming in "51 minutes or more in 1 hour" about a definite-period-of-time value, it changes into the conditions of stopping operation. However, the power value and time value here to fluctuate shall be set up freely. Since power dissipation decreases extremely at 5:00 of the next morning from 12:00 p.m. at night similarly and the number of times of on--off of load also decreases simultaneously, it is made to carry out a condition setup so that time to carry out shut down by the same method may be lengthened. [ with thus, the time zone which operates commencement of commercial operation or the conditions at the time of stopping ] By making a load power value and a time value fluctuate,

and performing commencement-of-commercial-operation stop control The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0020]

Moreover, in drawing 2, the memory means 10 memorizes the start stop data of operation of a fuel cell system, and is considering it as the composition which performs commencement of commercial operation and stop control according to a power consumption pattern peculiar to a setting position based on the data. In said memory means 10, the commencement-of-commercial-operation stop data of a fixed period, for example, the commencement-of-commercial-operation time and stopping time of 1 day by day, is memorized as data over a fixed period from the commencement of commercial operation of the beginning after fuel cell system installation. Various power consumption patterns can be considered by each setting position of a fuel cell system here. For example, according to various factors, such as number composition of families, such as the number of an unmarried person, a married man, and a child, age composition, sex or distinction of a city and rural areas, and distinction of a cold district and the warm ground, power consumption patterns differ and change of the load power by the increase in the number of times of on--off of load also becomes large. The commencement-of-commercial-operation stop data of a fixed period is memorized with the memory means 10 after installing a fuel cell system here. When power consumption is large, the case where there is much number composition of a family, and in the case of a young age group, by the case where there is much power consumption, it is made air-conditioning of an air conditioning etc., Lighting Sub-Division, and various electric appliances with a condition setup which lengthens operation time of a fuel cell system. That is, at the time of commencement of commercial operation, load power carries out "10%" reduction of the "30%" of "30% or more of the maximum generated output." That is, when the maximum generated output is 1000W, load power changes "more than 300W" into the conditions of "more than 200W." Moreover, "3-minute" reduction of the "24 minutes or more" of "80% or more of a 30-minute throughout" is carried out for a definite-period-of-time value. That is, after becoming in "21 minutes or more of a 30-minute throughout", it changes into the conditions of starting operation. Moreover, at the time of shut down, load power carries out "2.5%" reduction of "one eighth (12.5%)" of "1/8 or less [ of the maximum generated output ]." That is, when the maximum generated output is 1000W, load power changes "less than 125W" into the conditions of "less than 100W." Moreover, after carrying out the increase of "the 80% or more in 1 hour" in "3 minute" and becoming in "51 minutes or more in 1 hour" about a definite-

period-of-time value, it changes into the conditions of stopping operation. However, the power value and time value here to fluctuate shall be set up freely. Similarly, since the number of times of on--off of load also decreases simultaneously when there is little power dissipation; it is made to carry out a condition setup so that time to carry out shut down by the same method may be lengthened. Thus, commencement of commercial operation or the conditions at the time of stopping [ with the setting position of a fuel cell system ] By making a load power value and a time value fluctuate, and performing commencement-of-commercial-operation stop control The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0021]

moreover, drawing 2 -- it is, the start stop data of operation of a fuel cell system is memorized with the memory means 10, and it has composition which performs commencement of commercial operation and stop control according to change of the season in the setting position based on the data. A power consumption pattern changes with change of the season of spring, summer, fall and winter by the end of one year, in summer, power dissipation especially increases by air conditioning operation, and increases by heating operation in a winter season, or change of the load power by the increase in the number of times of on--off of load also becomes large. Here, the data during the season for every one year is memorized with said memory means 10, and when power consumption, such as summer and winter, becomes large, it is considered as a condition setup which lengthens operation time of a fuel cell system. That is, at the time of commencement of commercial operation, load power carries out "10%" reduction of the "30%" of "30% or more of the maximum generated output." That is, when the maximum generated output is 1000W, load power changes "more than 300W" into the conditions of "more than 200W." Moreover, "3-minute" reduction of the "24 minutes or more" of "80% or more of a 30-minute throughout" is carried out for a definite-period-of-time value. That is, after becoming in "21 minutes or more of a 30-minute throughout", it changes into the conditions of starting operation. Moreover, at the time of shut down, load power carries out "2.5%" reduction of "one eighth (12.5%)" of "1/8 or less [ of the maximum generated output ]." That is, when the maximum generated output is 1000W, load power changes "less than 125W" into the conditions of "less than 100W." Moreover, after carrying out the increase of "the 80% or more in 1 hour" in "3 minute" and becoming in "51 minutes or more in 1 hour" about a definite-period-of-time value, it changes into the conditions of stopping operation. However, the power value and time value here to fluctuate shall be set up freely. Thus, commencement of commercial operation or the conditions at the time of stopping [ with change

of an annual season ] By making a load power value and a time value fluctuate, and performing commencement-of-commercial-operation stop control, the number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of the energy by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system can be reduced.

[0022]

Moreover, in drawing 3, said controller 7 is considered as the composition which performs commencement of commercial operation and stop control by establishing the means of communication 11, such as a telephone line, by communicating commencement-of-commercial-operation stop data, storing up data in a host computer, carrying out centralized control, and making it reflected in each fuel cell system by said means of communication 11. For example, by storing commencement-of-commercial-operation stop data in the host computer of a gas company, and analyzing the various pattern data for every setting position, when power consumption is comparatively large, it is made a condition setup which lengthens operation time unitary. That is, at the time of commencement of commercial operation, load power carries out "10%" reduction of the "30%" of "30% or more of the maximum generated output." That is, when the maximum generated output is 1000W, load power changes "more than 300W" into the conditions of "more than 200W." Moreover, "3-minute" reduction of the "24 minutes or more" of "80% or more of a 30-minute throughout" is carried out for a definite-period-of-time value. That is, after becoming in "21 minutes or more of a 30-minute throughout", it changes into the conditions of starting operation. Moreover, at the time of shut down, load power carries out "2.5%" reduction of "one eighth (12.5%)" of "1/8 or less [ of the maximum generated output ]." That is, when the maximum generated output is 1000W, load power changes "less than 125W" into the conditions of "less than 100W." Moreover, after carrying out the increase of "the 80% or more in 1 hour" in "3 minute" and becoming in "51 minutes or more in 1 hour" about a definite-period-of-time value, it changes into the conditions of stopping operation. However, the power value and time value here to fluctuate shall be set up freely. Moreover, when power dissipation is comparatively small conversely, it is made to carry out a condition setup so that time to carry out shut down by the same method may be lengthened. Thus, by storing and carrying out centralized control of the commencement-of-commercial-operation stop data in each setting position to a host computer by a means of communication, and analyzing various pattern data By making a load power value and a time value fluctuate, and performing optimal commencement-of-commercial-operation stop control unitary The number of times of a commencement-of-commercial-operation stop cannot be made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before

performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[0023]

Moreover, in drawing 2 , a maximum is prepared in the total number of times of a commencement-of-commercial-operation stop among one day, and exceeding the maximum, commencement of commercial operation and when it stops, said controller 7 is considered as the composition kept from carrying out commencement of commercial operation. The maximum of the total number of times of a commencement-of-commercial-operation stop of the one day is beforehand set as about 2 usual times in the grade which is not usually attained in operation, and when the total number of times of a commencement-of-commercial-operation stop on the 1st carries out a commencement-of-commercial-operation stop exceeding the maximum set up beforehand, it is thought that a certain abnormalities occurred. When abnormalities arise as one example at the time of [ this ] becoming epidemic for the electric power load system including the load power detection means 8, said controller 7 is kept from starting operation here. Thereby, unusual operation of unusual operation of a fuel cell system and an electric power load system can be prevented, and the futility of temporary energy can also be reduced.

[0024]

Moreover, in drawing 2 , when a maximum is prepared in the total number of times of a commencement-of-commercial-operation stop among one day and a commencement-of-commercial-operation stop is carried out exceeding a maximum, said controller 7 is considered as the composition which reports abnormalities. [ when the total number of times of a commencement-of-commercial-operation stop on the 1st carries out a commencement-of-commercial-operation stop exceeding the maximum set up beforehand, it is thought that a certain abnormalities occurred, but ] By carrying out unusual information which tells that, when abnormalities arise as one example at the time of [ this ] becoming epidemic for the electric power load system including the load power detection means 8 While reporting a stop and malfunction of a fuel cell system to a user, it can be told to a user that check of an electric power load system, i.e., the abnormalities of electric appliances and the abnormalities of a distribution plant, is checked.

[0025]

[Effect of the Invention]

By making large the gap which starts a fuel cell system from the stop from commencement of commercial operation, and a stop as mentioned above by making an electric power condition value fluctuate commencement of commercial operation or the conditions at the time of stopping with commencement-of-commercial-operation stop frequency according to this invention The number of times of a commencement-of-commercial-operation stop cannot be

made to be able to increase, but it can reduce, and the futility of energies, such as preheating of the fuel cell system by repetition of the commencement-of-commercial-operation stop before performing the bad influence prevention and power generation operation to the endurance of a fuel cell system, can be reduced.

[Brief Description of the Drawings]

[Drawing 1] The block diagram of the control unit of the fuel cell system in the work example 1 of this invention

[Drawing 2] The block diagram of the control unit of the fuel cell system in the work example 2 of this invention

[Drawing 3] The block diagram of the control unit of the fuel cell system in the work example 3 of this invention

[Drawing 4] The block diagram of the control unit of the conventional fuel cell system

[Explanations of letters or numerals]

1 Hydrogen Generation Machine

4 Fuel Cell

7 Controller

8 Load Power Detection Means

9 Commencement-of-Commercial-Operation Stop Frequency Detection Means

10 Memory Means

11 Means of Communication

---

[Translation done.]